



## SEQUENCE LISTING

<110> Griffith, Irwin J.  
Kuo, Mei-Chang  
Lugman, Mohammad

<120> T CELL EPITOPES OF RYEGRASS POLLEN ALLERGEN

<130> IMI-040CP3

<140> 08/737,904

<141> 1996-11-20

<150> PCT/US94/09024

<151> 1994-08-05

<150> 08/106,016

<151> 1993-08-13

<160> 62

<170> PatentIn Ver. 2.0

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<211> 1229

<212> DNA

<213> Lolium perenne

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Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Leu Val Ala Gly Pro Ala  
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gcc tcc tac gcc gct gac gcc ggc tac acc ccc gca gcc gcg gcc acc 150  
Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Thr Pro Ala Ala Ala Ala Thr  
1 5 10

ccg gct act cct gct gcc acc ccg gct gcg gct gga ggg aag gcg acg 198  
Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Ala Gly Gly Lys Ala Thr  
15 20 25

acc gac gag cag aag ctg ctg gag gac gtc aac gct ggc ttc aag gca 246  
Thr Asp Glu Gln Lys Leu Leu Glu Asp Val Asn Ala Gly Phe Lys Ala  
30 35 40

gcc gtg gcc gcc gct gcc aac gcc cct ccg gcg gac aag ttc aag atc 294  
Ala Val Ala Ala Ala Ala Asn Ala Pro Pro Ala Asp Lys Phe Lys Ile  
45 50 55 60

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ttc gag gcc gcc ttc tcc gag tcc tcc aag ggc ctc ctc gcc acc tcc 342
Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly Leu Leu Ala Thr Ser
65 70 75

gcc gcc aag gca ccc ggc ctc atc ccc aag ctc gac acc gcc tac gac 390
Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys Leu Asp Thr Ala Tyr Asp
80 85 90

gtc gcc tac aag gcc gcc gag ggc gcc acc ccc gag gcc aag tac gac 438
Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro Glu Ala Lys Tyr Asp
95 100 105

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Ala Phe Val Thr Ala Leu Thr Glu Ala Leu Arg Val Ile Ala Gly Ala
110 115 120

ctc gag gtc cac gcc gtc aag ccc gcc acc gag gag gtc cct gct gct 534
Leu Glu Val His Ala Val Lys Pro Ala Thr Glu Glu Val Pro Ala Ala
125 130 135 140

aag atc ccc acc ggt gag ctg cag atc gtt gac aag atc gat gct gcc 582
Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp Lys Ile Asp Ala Ala
145 150 155

ttc aag atc gca gcc acc gcc gcc aac gcc gcc ccc acc aac gat aag 630
Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys
160 165 170

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Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala Leu Asn Glu Cys Thr
175 180 185

ggc ggc gcc tat gag acc tac aag ttc atc ccc tcc ctc gag gcc gcg 726
Gly Gly Ala Tyr Glu Thr Tyr Lys Phe Ile Pro Ser Leu Glu Ala Ala
190 195 200

gtc aag cag gcc tac gcc gcc acc gtc gcc gcc gcg ccc gag gtc aag 774
Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Pro Glu Val Lys
205 210 215 220

tac gcc gtc ttt gag gcc gcg ctg acc aag gcc atc acc gcc atg acc 822
Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met Thr
225 230 235

cag gca cag aag gcc ggc aaa ccc gct gcc gcc gct gcc aca ggc gcc 870
Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala Ala Ala Ala Thr Gly Ala
240 245 250

gca acc gtt gcc acc ggc gcc gca acc gcc gcc gcc ggt gct gcc acc 918
Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala Ala Gly Ala Ala Thr
255 260 265

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Ala Ala Ala Gly Gly Tyr Lys Ala
270 275

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 Ala Ala Ala Ala Thr Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Ala  
 10 15 20  
 Gly Gly Lys Ala Thr Thr Asp Glu Gln Lys Leu Leu Glu Asp Val Asn  
 25 30 35  
 Ala Gly Phe Lys Ala Val Ala Ala Ala Ala Asn Ala Pro Pro Ala  
 40 45 50 55  
 Asp Lys Phe Lys Ile Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly  
 60 65 70  
 Leu Leu Ala Thr Ser Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys Leu  
 75 80 85  
 Asp Thr Ala Tyr Asp Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro  
 90 95 100  
 Glu Ala Lys Tyr Asp Ala Phe Val Thr Ala Leu Thr Glu Ala Leu Arg  
 105 110 115  
 Val Ile Ala Gly Ala Leu Glu Val His Ala Val Lys Pro Ala Thr Glu  
 120 125 130 135  
 Glu Val Pro Ala Ala Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp  
 140 145 150  
 Lys Ile Asp Ala Ala Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala Ala  
 155 160 165  
 Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala  
 170 175 180  
 Leu Asn Glu Cys Thr Gly Gly Ala Tyr Glu Thr Tyr Lys Phe Ile Pro  
 185 190 195  
 Ser Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala  
 200 205 210 215  
 Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala  
 220 225 230  
 Ile Thr Ala Met Thr Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala Ala  
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 Ala Gly Ala Ala Thr Ala Ala Gly Gly Tyr Lys Ala  
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 <223> Xaa = hydroxyproline residue

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Ala Ala Ala Ala  
                     20

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Lys Phe Lys Ile  
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 Val His Ala Val  
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 Val Pro Ala Ala

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 Ala Pro Thr Asn  
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 Glu Ser Ala Phe  
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Cys Thr Gly Gly  
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<400> 21  
Asn Lys Ala Leu Asn Glu Cys Thr Gly Gly Ala Tyr Glu Thr Tyr Lys  
1 5 10 15

Phe Ile Pro Ser  
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1 5 10 15

Gln Ala Tyr Ala  
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Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala  
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Pro Glu Val Lys  
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Ala Thr Val Ala Ala Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Ala  
1 5 10 15

Ala Leu Thr Lys  
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Gln Ala Gln Lys  
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 Ala Ile Thr Ala Met Thr Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala  
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Ala Ala Ala Thr  
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 Ala Gly Lys Pro Ala Ala Ala Ala Thr Gly Ala Ala Thr Val Ala  
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Thr Gly Ala Ala  
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 Gly Ala Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala Ala Gly Ala  
 1 5 10 15

Ala Thr Ala Ala  
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 Thr Ala Ala Ala Gly Ala Ala Thr Ala Ala Ala Gly Gly Tyr Lys Ala  
 1 5 10 15

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Lys Trp Leu Asp  
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Gly Lys Pro Thr  
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<210> 33  
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Gly Ala Gly Pro Lys Asp Asn Gly Gly Ala Cys Gly Tyr Lys Asn Val  
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Asp Lys Ala Pro  
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<210> 34  
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Gly Ala Gly Pro Lys Asp Asn Gly Gly Ala Cys Gly Tyr Lys Asp Val  
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Asp Lys Ala Pro  
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Cys Gly Asn Thr  
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1 5 10 15

Arg Gly Cys Gly  
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Pro Ile Phe Lys Asp Gly Arg Gly Cys Gly Ser Cys Phe Glu Ile Lys  
1 5 10 15

Cys Thr Lys Pro  
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Ser Cys Phe Glu Ile Lys Cys Thr Lys Pro Glu Ser Cys Ser Gly Glu  
1 5 10 15

Ala Val Thr Val  
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Glu Ser Cys Ser Gly Glu Ala Val Thr Val Thr Ile Thr Asp Asp Asn  
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Glu Glu Pro Ile  
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Leu Ser Gly His  
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Asp Asp Gly Glu  
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Ala Gly Glu Leu  
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Glu Gln Lys Leu Arg Ser Ala Gly Glu Leu Glu Leu Gln Phe Arg Arg  
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Val Lys Cys Lys  
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<213> Lolium perenne

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Pro	Thr	Phe	His
			20

&lt;210&gt; 45

&lt;211&gt; 20

&lt;212&gt; PRT

&lt;213&gt; Lolium perenne

&lt;400&gt; 45

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Pro	Asn	Tyr	Leu
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&lt;211&gt; 20

&lt;212&gt; PRT

&lt;213&gt; Lolium perenne

&lt;400&gt; 46

Val	Glu	Lys	Ala	Ser	Asn	Pro	Asn	Tyr	Leu	Ala	Ile	Leu	Val	Lys	Tyr
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Val	Asp	Gly	Asp
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&lt;210&gt; 47

&lt;211&gt; 20

&lt;212&gt; PRT

&lt;213&gt; Lolium perenne

&lt;400&gt; 47

Val	Glu	Lys	Gly	Ser	Asn	Pro	Asn	Tyr	Leu	Ala	Ile	Leu	Val	Lys	Tyr
1				5					10					15	

Val	Asp	Gly	Asp
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&lt;210&gt; 48

&lt;211&gt; 20

&lt;212&gt; PRT

&lt;213&gt; Lolium perenne

&lt;400&gt; 48

Ala	Ile	Leu	Val	Lys	Tyr	Val	Asp	Gly	Asp	Gly	Asp	Val	Val	Ala	Val
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Asp	Ile	Lys	Glu
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&lt;210&gt; 49

&lt;211&gt; 20

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Ile Glu Leu Lys  
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Trp Arg Ile Asp  
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Gly Gly Thr Lys  
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Ile Pro Glu Gly  
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Tyr Ser Ala Lys  
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 <221> VARIANT  
 <222> (7)  
 <223> Xaa = hydroxyproline residue

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 <223> Xaa = hydroxyproline residue

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                   20                  25                  30

Lys

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Asn Gly Gly Ala  
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Gly Pro Phe Thr  
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 Val Gln Gln Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Ser Cys Arg  
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 -5 -1 1 5 10

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 Ala Thr Pro Ala Thr Pro Ala Ala Pro Gly Ala Ala Val Pro Ala Gly  
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 Lys Ala Ala Thr Glu Glu Gln Lys Leu Ile Glu Lys Ile Asn Ala Gly  
 30 35 40

ttc aag gcc gcc gtg gcg gcc gcc gcg ggc gtc ccg cca ggc gac aag 298  
 Phe Lys Ala Ala Val Ala Ala Ala Ala Gly Val Pro Pro Gly Asp Lys  
 45 50 55

tac aag acg ttc gtc gaa acc ttc ggc aag gcc tcc aac aag gcc ttc 346  
 Tyr Lys Thr Phe Val Glu Thr Phe Gly Lys Ala Ser Asn Lys Ala Phe  
 60 65 70

ctg ggg gac ctc ccg acc aac tac gcc gat gtc aac tcc agg gcc cag 394  
 Leu Gly Asp Leu Pro Thr Asn Tyr Ala Asp Val Asn Ser Arg Ala Gln  
 75 80 85 90

ctc acc tcg aag ctc gac gcc gcc tac aag ctc gcc tac gac gcc gcc 442  
 Leu Thr Ser Lys Leu Asp Ala Ala Tyr Lys Leu Ala Tyr Asp Ala Ala  
 95 100 105

cag ggc gcc acc ccc gag gcc aag tac gac gcc tac gtc gcc acc ctc 490  
 Gln Gly Ala Thr Pro Glu Ala Lys Tyr Asp Ala Tyr Val Ala Thr Leu  
 110 115 120

agc gag gcg ctc cgc atc atc gcc ggc acc ctc gag gtc cac gcc gtc 538  
 Ser Glu Ala Leu Arg Ile Ile Ala Gly Thr Leu Glu Val His Ala Val  
 125 130 135

aag ccc gct gcc gag gag gtc aag cct atc ccc gcc gga gag ctg cag 586  
 Lys Pro Ala Ala Glu Glu Val Lys Pro Ile Pro Ala Gly Glu Leu Gln  
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atc gtc gac aag att gac gtc gcc ttc aga act gcc gcc acc gcc gcc 634  
 Ile Val Asp Lys Ile Asp Val Ala Phe Arg Thr Ala Ala Thr Ala Ala  
 155 160 165 170



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aac gcc gcc ccc acc aac gac aag ttc acc gta ttc gag acc acc ttt 682
Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Thr Thr Phe
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aac aag gcc atc aag gag agc acg ggc ggc acc tac gag agc tac aag 730
Asn Lys Ala Ile Lys Glu Ser Thr Gly Gly Thr Tyr Glu Ser Tyr Lys
190 195 200

ttc att ccc acc ctt gag gcc gcc gtt aag cag gcc tac gcc gcc acc 778
Phe Ile Pro Thr Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr
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gtc gca tcc gcg ccg gag gtc aag tac gcc gtc ttt gag acc gcg ctg 826
Val Ala Ser Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Thr Ala Leu
220 225 230

aaa aag gcg gtc acc gcc atg tcc gag gcc cag aag gaa gcc aag ccc 874
Lys Lys Ala Val Thr Ala Met Ser Glu Ala Gln Lys Glu Ala Lys Pro
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gcc acc gcc acc ccg acc ccc acc gca act gcc gcg gcc gcg gtg gcc 922
Ala Thr Ala Thr Pro Thr Pro Thr Ala Thr Ala Ala Ala Ala Val Ala
255 260 265

acc aac gcc gcc ccc gtc gct gct ggt ggc tac aaa atc tgatcaactc 971
Thr Asn Ala Ala Pro Val Ala Ala Gly Gly Tyr Lys Ile
270 275

gctagcaata tacacatcca tcatgcacat atagagctgt gtatgtatgt gcatgcatgc 1031

cgtggcgccg cgcaagtttg ctcataatta attcttggtt ttcgttgctt gcatccacga 1091

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Cys Arg Ala Arg Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Ala Pro Ala
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Thr Pro Ala Thr Pro Ala Thr Pro Ala Ala Pro Gly Ala Ala Val Pro
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Ala Gly Lys Ala Ala Thr Glu Glu Gln Lys Leu Ile Glu Lys Ile Asn
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Ala Gly Phe Lys Ala Ala Val Ala Ala Ala Gly Val Pro Pro Gly
45 50 55

Asp Lys Tyr Lys Thr Phe Val Glu Thr Phe Gly Lys Ala Ser Asn Lys
60 65 70

Ala Phe Leu Gly Asp Leu Pro Thr Asn Tyr Ala Asp Val Asn Ser Arg

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Thr	Leu	Ser	Glu	Ala	Leu	Arg	Ile	Ile	Ala	Gly	Thr	Leu	Glu	Val	His
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Ala	Val	Lys	Pro	Ala	Ala	Glu	Glu	Val	Lys	Pro	Ile	Pro	Ala	Gly	Glu
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Tyr	Lys	Phe	Ile	Pro	Thr	Leu	Glu	Ala	Ala	Val	Lys	Gln	Ala	Tyr	Ala
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Lys	Pro	Ala	Thr	Ala	Thr	Pro	Thr	Pro	Thr	Ala	Thr	Ala	Ala	Ala	Ala
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